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Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [12/2022 -]
Title: HYBRID / BATTERY CONTROL: HYBRID BATTERY SYSTEM (for M20A-FXS): P1A6116,P31AB16; Hybrid/EV Battery Stack 2 Cell Circuit Voltage Below Threshold; 2023 - 2024 MY Prius Prius Prime [12/2022 -]		

DTC	**P1A6116**	**Hybrid/EV Battery Stack 2 Cell Circuit Voltage Below Threshold**

DTC	**P31AB16**	**Hybrid/EV Battery Stack 1 Cell Circuit Voltage Below Threshold**

DESCRIPTION

If the voltage of an HV battery cell is lower than the threshold for a certain amount of time, the battery ECU assembly will interpret this as a malfunction.

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	WARNING INDICATE	DTC OUTPUT FROM	PRIORITY	NOTE
P1A6116	Hybrid/EV Battery Stack 2 Cell Circuit Voltage Below Threshold	The voltage of any cell of the No. 2 HV supply stack sub-assembly has decreased excessively. (1 trip detection logic)	• HV battery • Battery ECU assembly	Comes on	Master Warning: Comes on	HV Battery	A	SAE Code: P1A61
P31AB16	Hybrid/EV Battery Stack 1 Cell Circuit Voltage Below Threshold	The voltage of any cell of the No. 1 HV supply stack sub-assembly has decreased excessively. (1 trip detection logic)	• HV battery • Battery ECU assembly	Comes on	Master Warning: Comes on	HV Battery	A	SAE Code: P31AB

CAUTION:

Do not charge the HV battery using the THS charger if DTC P1A6116 or P31AB16 is output.

MONITOR DESCRIPTION

If the battery ECU assembly detects that the voltage of any HV battery cell has decreased excessively, the battery ECU assembly will illuminate the MIL and store a DTC.

MONITOR STRATEGY

Related DTCs	P1A61 (INF P1A6116), P31AB (INF P31AB16): Cell voltage low
Required sensors/components	Battery ECU assembly
Frequency of operation	Continuous
Duration	TMC's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not stored	TMC's intellectual property
Other conditions belong to TMC's intellectual property	-

TYPICAL MALFUNCTION THRESHOLDS

TMC's intellectual property	-

COMPONENT OPERATING RANGE

Battery ECU assembly	DTC P1A61 (INF P1A6116) is not detected DTC P31AB (INF P31AB16) is not detected

CONFIRMATION DRIVING PATTERN

HINT:

- After repair has been completed, clear the DTC and then check that the vehicle has returned to normal by performing the following All Readiness check procedure.

  Click here INFO
- When clearing the permanent DTCs, refer to the "CLEAR PERMANENT DTC" procedure.

  Click here INFO

1. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
2. Turn the ignition switch off and wait for 2 minutes or more.
3. Drive the vehicle on urban roads for approximately 10 minutes.[*1]

   HINT:

   [*1]: Normal judgment procedure.

   The normal judgment procedure is used to complete DTC judgment and also used when clearing permanent DTCs.
4. Enter the following menus: Powertrain / HV Battery / Utility / All Readiness.
5. Check the DTC judgment result.

   HINT:

   - If the judgment result shows NORMAL, the system is normal.
   - If the judgment result shows ABNORMAL, the system has a malfunction.
   - If the judgment result shows INCOMPLETE, perform the normal judgment procedure again.

WIRING DIAGRAM

Refer to the wiring diagram for DTC P1A001C.

Click here INFO

CAUTION / NOTICE / HINT

CAUTION:

Refer to the precautions before inspecting high voltage circuit.

Click here INFO

NOTICE:

- After the ignition switch is turned off, there may be a waiting time before disconnecting the negative (-) auxiliary battery terminal.

  Click here INFO
- When disconnecting and reconnecting the auxiliary battery

HINT:

When disconnecting and reconnecting the auxiliary battery, there is an automatic learning function that completes learning when the respective system is used.

Click here INFO

HINT:

Thoroughly interview the customer as DTCs P1A6116 and P31AB16 may be stored if the SOC drops due to the vehicle running out of fuel, or the use of incorrect or low-quality fuel.

PROCEDURE

1.	**CHECK DTC OUTPUT (HV BATTERY, HYBRID CONTROL)**

Pre-procedure1

(a) None

Procedure1

(b) Check for DTCs.

Powertrain > HV Battery > Trouble Codes
Powertrain > Hybrid Control > Trouble Codes

RESULT	PROCEED TO
"P1A6116 or P31AB16" only is output, or DTCs except the ones in the table below are also output.	A
DTCs of hybrid battery system in the table below are output.	B
DTCs of hybrid control system in the table below are output.	C

SYSTEM	RELEVANT DTC	
Hybrid battery system	P060A47	Hybrid/EV Battery Energy Control Module Monitoring Processor Watchdog / Safety MCU Failure
	P060B49	Hybrid/EV Battery Energy Control Module A/D Processing Internal Electronic Failure
	P060687	Hybrid/EV Battery Energy Control Module Processor to Monitoring Processor Missing Message
Hybrid control system	P0A1F94	Hybrid/EV Battery Energy Control Module Unexpected Operation

Post-procedure1

(c) Turn the ignition switch off.

B ▶ **GO TO DTC CHART (HYBRID BATTERY SYSTEM)**

C ▶ **GO TO DTC CHART (HYBRID CONTROL SYSTEM)**

A

2.	**CHECK DTC**

(a) Check the DTCs that were output when the vehicle was brought to the workshop.

RESULT	PROCEED TO
"P1A6116" is also output.	A
"P31AB16" is also output.	B

B ▶ **GO TO STEP 7**

A

3.	**CHECK CONNECTOR CONNECTION CONDITION (BATTERY ECU ASSEMBLY CONNECTOR)**

Click here INFO

RESULT		PROCEED TO
OK		A
Not connected securely	The terminals are not damaged or corroded	B
Not connected securely	The terminals are damaged or corroded	C

B ▶ **CONNECT SECURELY**

C ▶ **REPLACE HV BATTERY**

A

4.	CHECK FREEZE FRAME DATA (HYBRID/EV BATTERY CELL VOLTAGE)

Pre-procedure1

(a) None

Procedure1

(b) Read the value of freeze frame data items "Hybrid/EV Battery Cell 31 Voltage" through "Hybrid/EV Battery Cell 60 Voltage" for DTC P1A6116 and make a note if the value of any is 1.6 V or less.

Powertrain > HV Battery > Trouble Codes

Post-procedure1

(c) Turn the ignition switch off.

NEXT

5.	CHECK HV BATTERY (HV BATTERY CELL VOLTAGE 31 - 60)

Click here INFO

RESULT	PROCEED TO
The voltage between the terminals is 1.6 V or less.	A

RESULT	PROCEED TO
Other than above	B

B ▶ **REPLACE BATTERY ECU ASSEMBLY**

A

6.	**CHECK BATTERY ECU ASSEMBLY (VAD - VA60)**

Click here INFO

RESULT	PROCEED TO
The voltage between the terminals is 50 kΩ or more.	A
Other than above	B

A ▶ **REPLACE HV BATTERY**

B ▶ **REPLACE BATTERY ECU ASSEMBLY**

7.	**CHECK CONNECTOR CONNECTION CONDITION (BATTERY ECU ASSEMBLY CONNECTOR)**

Click here INFO

RESULT		PROCEED TO
OK		A
Not connected securely	The terminals are not damaged or corroded	B
Not connected securely	The terminals are damaged or corroded	C

B ▶ **CONNECT SECURELY**

C ▶ **REPLACE HV BATTERY**

A

8.	**CHECK FREEZE FRAME DATA (HYBRID/EV BATTERY CELL VOLTAGE)**

Pre-procedure1

(a) None

Procedure1

(b) Read the value of freeze frame data items "Hybrid/EV Battery Cell 1 Voltage" through "Hybrid/EV Battery Cell 30 Voltage" for DTC P31AB16 and make a note if the value of any is 1.6 V or less.

Powertrain > HV Battery > Trouble Codes

Post-procedure1

(c) Turn the ignition switch off.

NEXT

9.	**CHECK HV BATTERY (HV BATTERY CELL VOLTAGE 1 - 30)**

Click here INFO

RESULT	PROCEED TO
The voltage between the terminals is 1.6 V or less.	A
Other than above	B

B **REPLACE BATTERY ECU ASSEMBLY**

A

10.	**CHECK BATTERY ECU ASSEMBLY (GA0 - VA30)**

Click here INFO

RESULT	PROCEED TO
The voltage between the terminals is 50 kΩ or more.	A
Other than above	B

A ▶ **REPLACE HV BATTERY**

B ▶ **REPLACE BATTERY ECU ASSEMBLY**